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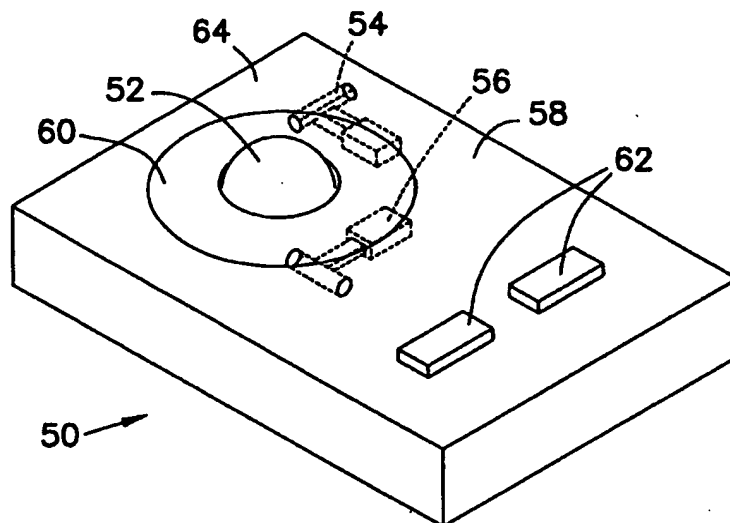
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(54) Title: CAPACITIVE SWITCH FOR A POINTING DEVICE



(57) Abstract

A pointing device has an input mechanism, and a touch sensor coupled proximate the input mechanism. The touch sensor actuates a power switch when touched by a user. In one embodiment, the pointing device is a track ball, and the touch sensor is an annular ring around the track ball allowing the user to hold the device and not activate the power switch. When the user is ready to use the device, as indicated by placing a hand or digit near the track ball, the touch sensor activates the switch to provide power to the input mechanism and other circuitry in the pointing device.

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CAPACITIVE SWITCH FOR A POINTING DEVICE

Field of the Invention

The present invention relates to a pointing device for use with a computer system, a convergence system, or the like. More specifically, the present invention relates to such systems having a pointing device with a touch sensor power switch.

Background of the Invention

To many people, the keyboard is the most formidable aspect of information handling systems such as personal computers, terminals, or multifunction televisions. Learning keyboard commands or typing is often difficult and time consuming. Accordingly, the computer industry has sought for years to provide for a more convenient way to input information to computer systems. Perhaps the most popular alternatives to the keyboard are the so-called pointing devices such as a computer mouse, track ball, joystick, or the like. With a pointing device, the user is able to indicate desired functions by selecting from a list of commands presented as a menu displayed on a screen. The user controls an on-screen cursor with the pointing device. The user directs the cursor to a displayed menu item and, with one or more buttons typically on the pointing device, selects a function corresponding with the item of the menu.

More and more systems rely on menus and pointing devices for inputting user selected functions. For example, the most popular operating systems for personal computers rely extensively on inputs provided from menus and pointing devices. Additionally, smart television systems now provide for banner overlays with menus displayed on the television screen or monitor. The user accesses the menu items with a cursor controlled by a pointing device located on the remote control. As demand for smart television systems increases, the use of pointing devices with such systems should become as pervasive as in personal computers.

On-screen controlled functions also provide for more ease and flexibility than typical remote controls. A pointing device with no more than just a few buttons is a relatively simple device to learn and master. Additionally, programmers can customize the menus for a particular application. Each application on such a system, which in total could include dozens of menus and functions, could be operated with a single pointing device and a few buttons. With a typical remote control, each button often represents a unique function. Thus, as more functions are added as a consequence of the demand for more applications, the

number of buttons on a typical remote control can grow quite large. As this number grows, the remote control becomes like a keyboard, a more formidable device with a more rigorous learning curve.

Both types of controls are designed so that a user may comfortably hold the controls even when not in use. The user often holds a device for convenience so that it is available when needed. Accordingly, such devices are used for actually selecting functions or inputting commands during only a very small percentage of time that they are held, manipulated or otherwise by the user.

Typical remote controls, however, use less energy than many pointing devices, which
10 saves money and otherwise conserves resources. A typical remote control, however, only
uses power when its function buttons are actuated. On the other hand, the design of many
pointing devices requires them to constantly draw power when they are available for use,
even though function commands are not selected. Alternatively, some prior art pointing
devices draw power only when handled by the user. Still, because many device are handled
15 for far greater periods than they are used to select functions, this solution is limited at best.

Accordingly, if a user of a pointing device wants to conserve power, the user can place the pointing device down or otherwise not make it available for use during periods when the user does not wish to select functions. This poses an inconvenience for the user, as many now have become accustomed to holding a remote control and selecting functions with minimal effort. Further, constantly putting a remote control down increases the likelihood that it will become misplaced, which, even if lost for a few seconds, can create frustration. The user of a pointing device is then required to choose between these inconveniences and the additional costs incurred from frequently replacing batteries or inefficiently using power, downtime associated with dead batteries and no available replacement.

25 Summary of the Invention

The present invention is directed to a system having a pointing device with a selectively operable power switch generally independent of providing inputs to the system. More particularly, the present invention provides for a pointing device of the type that draws power independent of user selected inputs, but which conserves power in that it draws power only at about the time of the user selected inputs.

One aspect of the invention is a control device for providing inputs to a host system. Power to the device is controlled through a power switch. The device includes a chassis

having a surface area, an input mechanism, and a touch sensor. The input mechanism includes a pointing device and at least one button. The input mechanism is operably coupled to the chassis. The input mechanism provides the host system with an input command via electromagnet or other transmitter or via cable connecting it to the system. The touch sensor
5 is operably coupled to the chassis and proximate the input mechanism. The touch sensor actuates the power switch when touched by the user and has an area less than the surface area. In one embodiment, the pointing device is a track ball, and the touch sensor is an annular ring attached to the chassis and around the track ball. The user can hold the device and not activate the power switch. When the user is ready to use the device, as indicated by placing a
10 hand or digit near the track ball, the touch sensor will activate the power. Manipulation of the track ball then results in immediate transmission of signals to the host system.

The present invention includes many advantages. Among these is that it provides for power conservation in pointing devices designed to draw power independent of supplying input commands. This feature is useful in lap top computers having built in pointing devices,
15 and in remote pointing devices which include batteries. It also provides for an automatic power switch so the user does not need to constantly turn on and off power along with providing input commands to the host system. It provides for a user to manipulate the device but to only activate the power switch at about the time of providing input commands.

Description of the Drawings

- 20 Figure 1 is a block diagram of a system constructed in accordance with the present invention.
- Figure 2 is a schematic diagram of a pointing device shown as part of the system of Figure 1.
- Figure 3 is a block diagram of the features of the pointing device shown in Figure 2.
- 25 Figure 4 is a schematic diagram of a feature of the pointing device shown in Figure 2.

Detailed Description of the Embodiments

In the following detailed description of the preferred embodiments, reference is made to the accompanying drawings which form a part hereof, and in which is shown by way of illustration specific embodiments in which the inventions may be practiced. These
30 embodiments are described in sufficient detail to enable those skilled in the art to practice the invention, and it is to be understood that other embodiments may be utilized and that logical,

mechanical and electrical changes may be made without departing from the spirit and scope of the present invention. The following detailed description is, therefore, not to be taken in a limiting sense, and the scope of the present invention is defined only by the appended claims.

In Figure 1, an exemplary system 18 for implementing the present invention includes
5 a general purpose computing device in the form of a conventional personal computer indicated by broken line 20, an image input device 22 such as a scanner, or the like, and a printer 24 connected together via an interface 26. The personal computer 20 includes a console 30 comprising a keyboard, pointing device, and display for use by an operator to supply commands to the system 18. The console 30 is connected to a processor 32. A
10 memory 34 is connected to the processor 32 via a memory bus 36. The memory 34 stores data and programs used by the processor 32. The computer 20 also includes a storage unit 40 such as a disc drive operated by a controller 42, or alternatively, a flash memory device. The storage unit 40 provides nonvolatile storage of computer readable instructions, data structures, program modules, and other data for the personal computer 20. A printer
15 controller 44 controls the printer 22 and connects the printer 22 to the interface 26. Likewise, an image input controller 46 controls the image input device 24 and connects the image input device 24 to the interface 26.

A number of variations to the above described system are contemplated. The personal computer can be in a networked environment using connections to one or more remote
20 computers, storage devices, or other peripherals such as printers and scanners. It will be appreciated that the connections shown are exemplary and other communication links between the devices may be employed. Also, the present invention is suitable for implementation on a convergence system. A convergence system refers to a system that includes capabilities that are otherwise provided by separate systems. For example, the
25 Gateway Destination PC/TV system, from Gateway, Inc., of North Sioux City, South Dakota, provides for both computer and television capability. A convergence system brings together several television inputs such as radio-frequency, satellite, cable, or digital television. In addition to running computer programs, a convergence system may access a wide area network such as the Internet. The convergence system may also bring together several
30 consumer electronic devices such as video cassette recorders, laser disc players, video cameras, game modules, or the like. The user can access these inputs and devices through a multi-function remote control which can include a pointing device or be in the form of a pointing device.

Figure 2 shows a schematic diagram of a pointing device 50, which is part of the console 30 of Figure 1. In one embodiment, the pointing device 50 is physically connected to the host system by way of a cable, or the like, and data is electrically transmitted over a conductor between the pointing device and the host system. In another embodiment, the pointing device 50 is not physically connected to the host system, and data is transmitted via electromagnetic signals such as RF, or the like, from a transmitting antenna on the pointing device 50 to a receiving antenna on the host system. The pointing device 50 in the illustrated embodiment includes a ball transducer 52 operably coupled to a pair of directional sensors 54, 56 within a chassis 58. An annular touch plate 60 is attached to a chassis 58 around the periphery of the ball transducer 52. The chassis is formed of plastic in a well known manner and can take the many shapes as desired by users or designers. The chassis 58 supports the elements described above, some of which are disposed within the chassis, and other of which are supported on a surface of the chassis to make them available for convenient use by a user. The pointing device 50 also includes button switches 62 on the surface of chassis 58 which can be actuated to provide user inputs in the form of command signals to the host system. The pointing device 50 further includes a dormant portion 64, which results in no signals being sent when handled by a user.

The ball transducer 52 is utilized in the illustrated embodiment in conjunction with a mechanical type track ball. Those skilled in the art now know that the ball transducer 52 can be used in conjunction with other types of pointing devices, such as a mouse. The user of the track ball selectively rotates the ball transducer 52. Rotation of the ball transducer 52 causes a concurrent rotation of the directional sensors 54, 56. The directional sensors 54, 56 reduce the movement of the ball transducer 52 into orthogonal components. Values of the orthogonal components are converted into position signals which, along with the command signals, are provided to the host system as data representative of a user input. The touch plate 60 is described below.

Figure 3 shows a block diagram of the circuitry of the pointing device 50 illustrated in Figure 2. Digital signals generated by the ball transducer 52 and switches 62 in response to user manipulation of the pointing device 50, collectively referred to as pointing device data 70, are provided to a data encoder 72. Also, a sampling signal generated by a sampling circuit 74 is provided to the data encoder 72. The data encoder 72 samples the pointing device data 70 at a frequency equal to the sampling signal and generates the pointing device data 70 as a time division multiplexed, digital signal to a serial data voltage converter 76.

Alternatively, the pointing device 50 can have separate channels for each or subsets of the pointing device data 70 rather than multiplexing the signals. In the illustrated embodiment, the pointing device data is transmitted to the host system over a frequency modulated radio signal rather than over a cable. Accordingly, the serial voltage converter 76 converts the pointing device data 70 into an analog signal and enters the analog signal into a transmitter circuit 78 as a control voltage. The sampling circuit 74 also provides signals to operate the transmitter circuit 78. The transmitter circuit 78 amplifies a modulated data signal, and then transmits the data via an internal antenna to the host system.

The pointing device 50 also includes a power source 80 which is used to provide power to the components of the circuitry. The power source 80 can be contained within the chassis 58 of the pointing device 50, and can take the form of a battery. Alternatively, power can be provided from the host system to the pointing device 50 over the cable. A power switch 82 is included electrically between the power source 80 and the components, and physically on the pointing device 50, to provide power to the components only when needed.

Figure 4 shows a schematic diagram of the power switch 82 shown in Figure 3. Power switch 82 is shown in the form of a capacitive switch. The touch plate 60 is electrically connected to a CMOS amplifier 90, which has another input 92 connected to a reference voltage such as electrical ground. The output 94 of the amplifier 90 is provided to comparator or level switch 96. The output of the comparator 96 is provided to a gate 98 of a field effect transistor 100. The field effect transistor 100 includes a source 102 connected to Vcc and a drain 104 connected to the power source 80. In operation, the touch plate 60 provides one plate of a capacitor. A user who places a hand or digit near the touch plate affects the capacitance of the switch 82 in a well known manner. A signal resulting from the change in capacitance is amplified and provided to the comparator 96. When the comparator 96 detects the change, it provides an output to the gate 98 to activate the transistor 100. The resulting signal at the drain 104 is used to activate the power source 80. It should be noted, that components of the switch are powered independent of activation of transistor 100.

In one embodiment, the touch plate 60 is located proximate the ball transducer 52 underneath a thin insulating layer. Alternatively, the touch plate 60 is outside of the pointing device 50 and on top of the chassis 58.

In the illustrated embodiment, the touch plate 60 occupies only a relatively small region on the chassis 58. Thus, the power source 80 is not activated whenever the pointing device 50 is touched. Rather, the power source 80 is activated only when an activation

region, i.e., the touch plate 60, of the pointing device 50 is touched. The activation region is, in the illustrated embodiment, proximate the ball transducer 52. Alternatively, the activation region can be the ball transducer 52 itself such that as a user approaches touching the ball transducer 52, power is applied to the remaining circuitry in the pointing device to ensure it is ready to receive user input.

Although the present invention has been described with reference to preferred embodiments, workers skilled in the art will recognize that changes may be made in form and detail without departing from the spirit and scope of the invention.

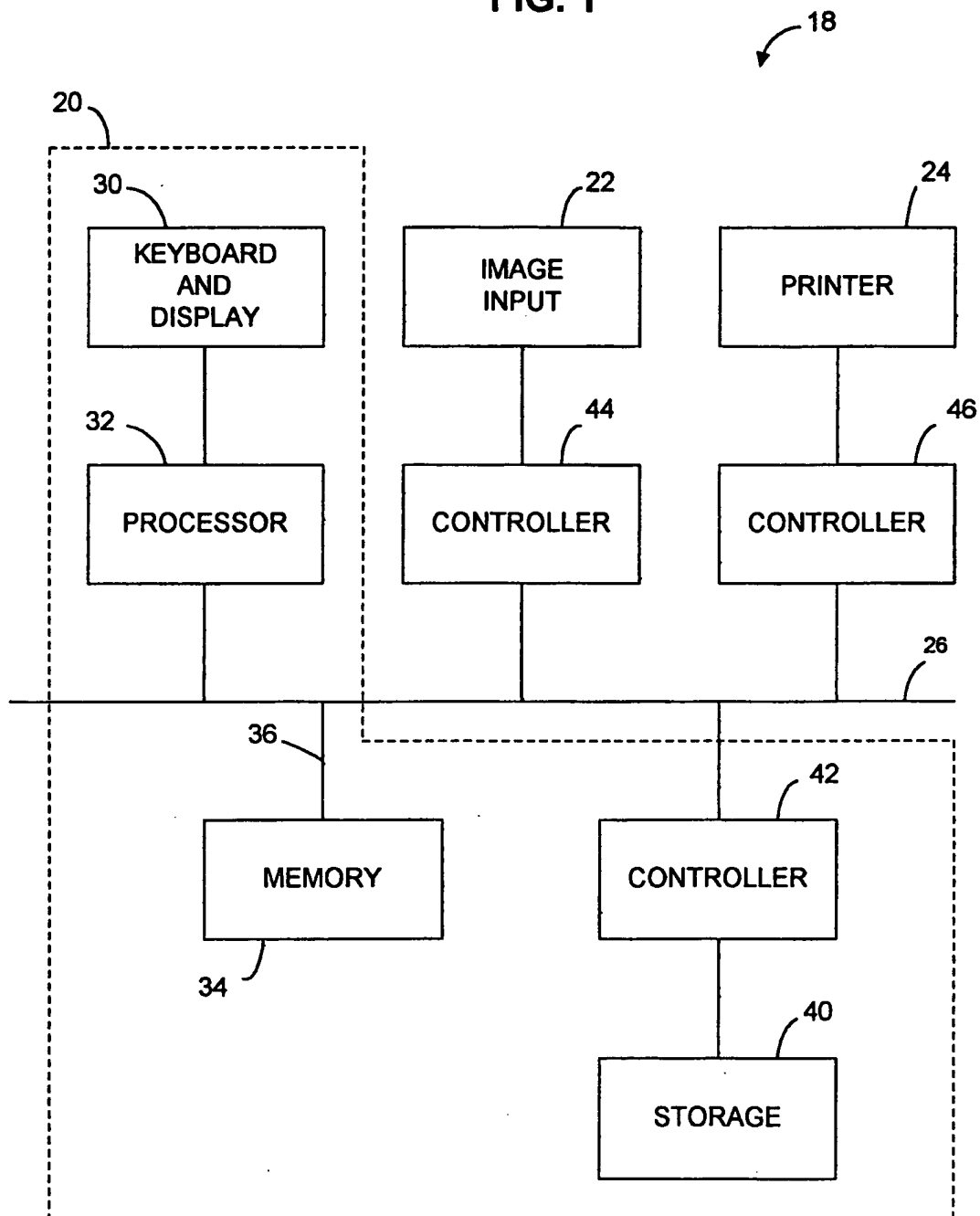
What is Claimed is:

1. A device for providing inputs to a host system and powered through a power switch, the device comprising:
a chassis having a surface;
an input mechanism having a pointing device operably coupled to the chassis, the input mechanism for providing the host system with an input command; and
a touch sensor, coupled to the chassis and proximate the input mechanism and operably coupled to the power switch.
2. The device of claim 1, and further comprising input circuitry operably coupled to the chassis and actuated by the input mechanism for providing an input to the host system.
3. The device of claim 2 wherein the chassis is physically disconnected from the host system.
4. The device of claim 3 wherein the input circuitry provides the input to the host system via electromagnetic radiation.
5. The device of claim 1 wherein the touch sensor is an annular member surrounding the pointing device.
6. The device of claim 5 wherein the pointing device is a track ball.
7. The device of claim 1, and further comprising an insulating layer covering the touch sensor.
8. The device of claim 1 wherein the power switch includes a capacitive switch operably connected to the touch sensor.
9. The device of claim 8 wherein the power switch is coupled to a power source selected from the group comprising a battery located within the chassis and a cable coupled to the host system.

10. The device of claim 1 wherein the power switch is actuated independent of providing the host system with an input command.
11. A system, comprising:
 - a host comprising a processor suitable for executing a program; and
 - an input device having a pointing device, a touch sensor, and a dormant portion supported thereby;
 - wherein the input device is operably coupled to the host for providing a set of input commands to the processor and powered through a power switch actuated by the touch sensor, wherein the touch sensor is supported proximate the pointing device, and wherein touching the dormant portion does not actuate the power switch.
12. The system of claim 11 wherein the pointing device is a ball transducer and the touch sensor is a ring surrounding the ball transducer.
13. The system of claim 12 wherein the ring is covered by an insulator.
14. The system of claim 11 wherein the input device is a track ball.
15. The system of claim 11 wherein the host is a computer.
16. The system of claim 11 and further comprising a monitor for providing an output.
17. The system of claim 11 wherein the program generates a set of menu items for providing functions, and the menu items are selectable with the input device.
18. The system of claim 11 wherein the input device is physically connected to the host.
19. The system of claim 11 wherein the input device provides the set of input commands over a radio signal.

20. A computer system comprising:
- a processor;
 - a display coupled to the processor;
 - a keyboard coupled to the processor;
 - a pointing device coupled to the keyboard;
 - a power source;
 - a switch coupled to the power source; and
 - a sensor operably coupled to the switch and the pointing device, the sensor being responsive to a user approaching manipulation of the pointing device.

FIG. 1



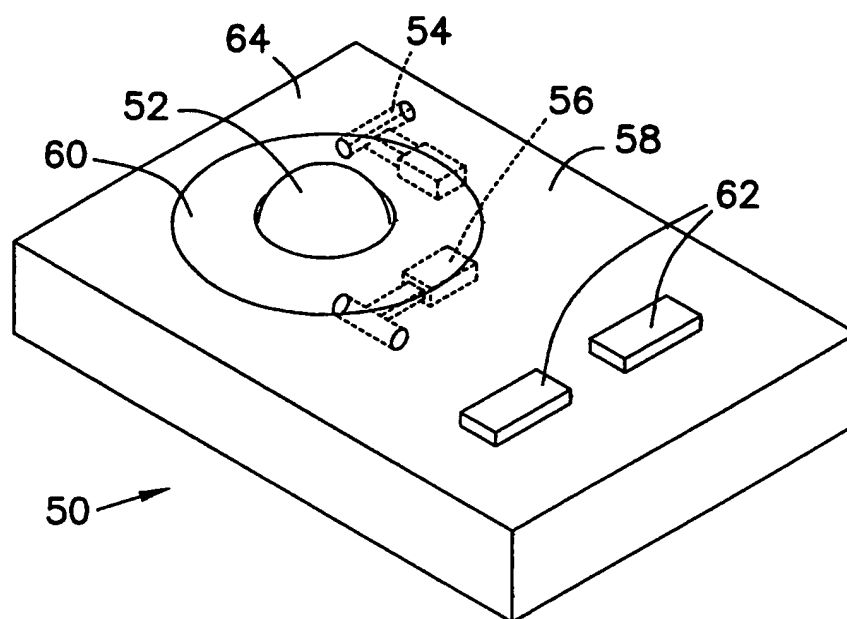


FIG. 2

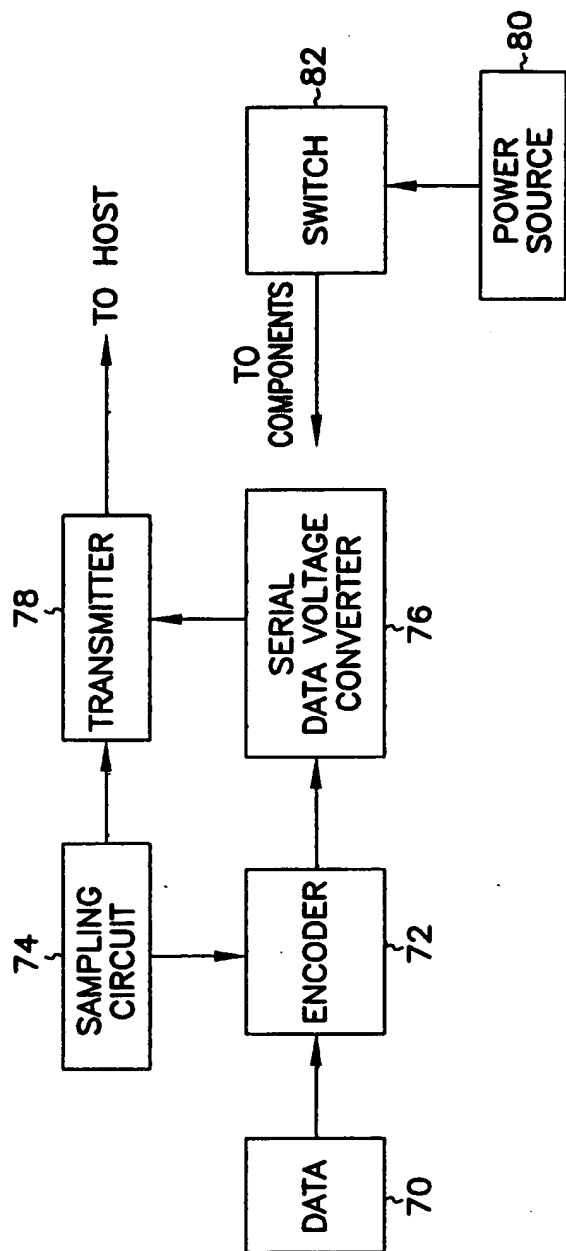


FIG. 3

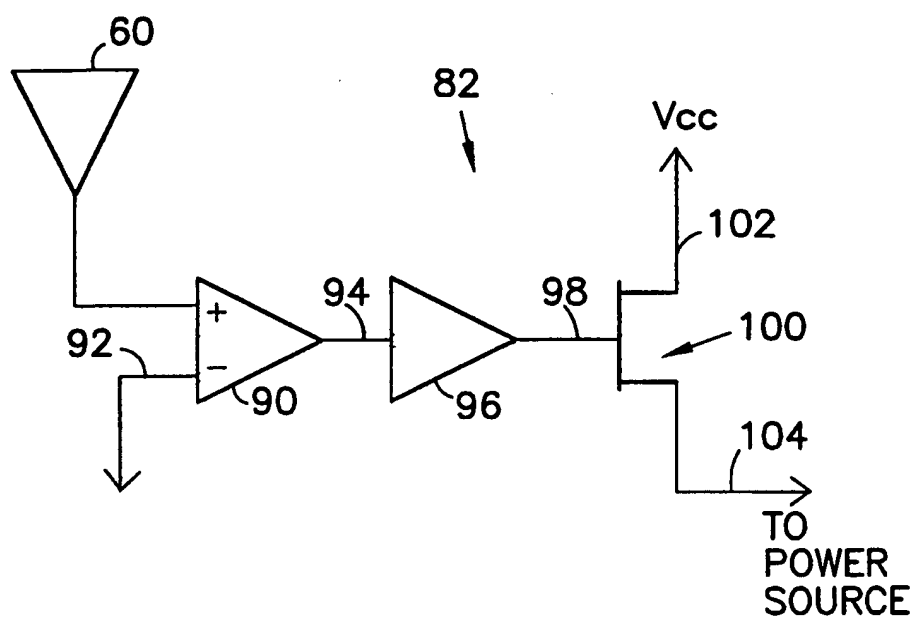


FIG. 4

INTERNATIONAL SEARCH REPORT

International Application No.

PCT/US 99/18265

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 G06F3/033

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 G06F G06K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 97 36257 A (GATEWAY 2000 INC.) 2 October 1997 (1997-10-02) page 17, line 27 -page 18, line 29; claim 15; figures 9,10 ---	1-4,6, 10,11, 14-17, 19,20
A	US 5 554 980 A (HASHIMOTO ET AL.) 10 September 1996 (1996-09-10) column 13, line 66 -column 15, line 59; figures 1,2 ---	1-4,10, 11,16, 17,20
A	US 5 777 605 A (YOSHINOBU ET AL.) 7 July 1998 (1998-07-07) column 5, line 18 - line 52; figures 3,4 ---	1-4,10, 11,16,19
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Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

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Date of the actual completion of the international search

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INTERNATIONAL SEARCH REPORT

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	GB 2 276 261 A (SONY CORP.) 21 September 1994 (1994-09-21) page 5, line 1 -page 6, line 23; figures 1-3 -----	1-4,10, 11,16
A	US 5 396 443 A (MESE ET AL.) 7 March 1995 (1995-03-07) column 1, line 58 -column 4, line 40; figures 1-6 -----	1,2,7,9, 20

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No.

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